Operationalization Plan

Indicators
- Pre-Test Standardized test score - **Spanish Proficiency Test**
  Post-Test Standardized test score - **Spanish Proficiency Test**
- Weekly quiz score in the app

Instruments
- Semi structured interviews
- Standardized test
- Quiz

Independent Variables
- Medium - VR, App
- Platform - Mondly

Dependent variables
- Post-Test Standardized test score - **Spanish Proficiency Test**
- Weekly quiz score in the app

Units of analysis

- Individuals

Method & Details about Data collection

- Within group study
- 8 people over 6 weeks
- Participants are young adults with college degrees

Begin study
- Step 1

Each participant would take the standardized test and their scores would be logged.

- Step 2

Each week there are lessons pre-determined in Mondly that each participant would take and at the end of each week there would be a quiz whose score would be logged. This is repeated over 6 weeks for all 8 participants; of the 6 weeks, each medium would be used for 3 weeks where the weeks are randomly assigned and balanced by a Latin-Square design as shown in figure below.

Participant/Week	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
1	VR	APP	APP	VR	VR	APP
2	APP	VR	APP	APP	VR	VR
3	APP	VR	VR	APP	APP	VR
4	VR	APP	VR	APP	APP	VR
5	APP	VR	VR	APP	APP	VR
6	VR	APP	APP	VR	APP	VR
7	VR	APP	VR	APP	VR	APP
8	APP	VR	VR	APP	VR	APP

- Step 3
  After the end of 6 weeks, each participant is required to take the standardized Spanish proficiency test again as well as a post-test survey.

Hypotheses

- **Alternative hypothesis**
1. Using VR for learning will help an individual better learn a language.
2. Using Mondly will help participants learn the Spanish language.

- **Null hypothesis**
1. Using VR for learning will not help an individual better learn a language.
2. Using Mondly will not help participants learn the Spanish language.